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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/546,392	04/10/2000	Atsushi Watanabe	392.1681/JDH	2369

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EXAMINER

HESSELTINE, RYAN J

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 01/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/546,392

Applicant(s)

WATANABE ET AL.

Examiner

Ryan J Hesseltine

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 April 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 April 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. Figure 4 (page 8, line 5-7) and figures 8-10 (page 8, line 25 to page 9, line 2) should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities:
 - Page 9, line 15 states that the scanning operation is shown in Figure 7, but this operation is shown in Figure 8.
 - Page 9, line 21 refers to RAM with reference numeral 38, but figure 4 shows this as reference numeral 39.
 - Page 20, line 7-8 refers to non-volatile memory with reference numeral 37, but figure 4 shows this as reference numeral 38.
 - Page 21, line 5 refers to processor with reference numeral 1, but figure 4 shows this as reference numeral 31.
 - Page 22, line 1 refers to a camera with reference numeral 20, but figure 1 shows two cameras, one with reference numeral 21, and one with reference numeral 22.

Appropriate correction is required.

Claim Objections

4. Claims 2 and 13 are objected to because of the following informalities: line 2 states, "reference models are obtained *form* a part of the image." Applicant apparently intended this to be "obtained *from* a part of the image." Appropriate correction is required.
5. Claim 6 is objected to because of the following informalities: Claim 6 does not end with a period. Appropriate correction is required.
6. Claims 11 and 22 are objected to because of the following informalities: line 2-3 states, "picking up at least one object *form* a plurality of objects." Applicant apparently intended this to be "object *from* a plurality of objects." Appropriate correction is required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 8-10 and 19-21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 8-10 and 19-21 recite the limitation "said second image data capturing device." There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-4 and 12-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Suzuki (USPN 4,835,450).

11. Regarding claim 1, Suzuki discloses a robot system having an image processing function for determining posture, or posture and position of a robot operation on an object (column 4, line 25-39) comprising: a robot (figure 1, element 3); a first image capturing device (figure 1, element 11a); a memory storing reference models (figure 2, element 19) created based on image data of a reference object captured by said image capturing device in a plurality of different directions, and storing information of the capturing directions to be respectively associated with said reference models, and information of orientation of the robot operation with respect to the object (column 3, line 66 to column 4, line 9), said reference object (figure 1, element 10) being the object of detection or an object having a shape identical (figure 1, element 15) to that of the object of detection (column 3, line 57-62); and a processor (figure 2, element 18) to perform matching processing on image data containing an image of the object of detection captured by said image capturing device with said reference models to select an image of an object matched with one of said reference models (column 4, line 17-24), and to determine orientation, or orientation and position of an operation to be performed by the robot based on the selected image of the object, said one reference model and the information of the capturing direction and the information of the orientation of the robot operation with respect to the object associated with said one reference model (column 5, line 5-11).

12. Regarding claim 12, which is substantially the same as claim 1 except that claim 12 includes the limitation that the memory stores reference models created based on image data of

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different kinds of reference objects, Suzuki discloses a robot system having an image processing function including a memory storing reference models created based on image data of different kinds of reference objects captured by said first image capturing device (column 4, line 17-24). See discussion of claim 1 above for all other common features.

13. Regarding claims 2 and 13, Suzuki discloses that said reference models are obtained from a part of the image data of the reference object (column 4, line 2-9).

14. Regarding claims 3 and 14, Suzuki discloses that said reference models are obtained by processing the image data of the reference object (column 4, line 5-16).

15. Regarding claims 4 and 15, Suzuki discloses that said first image capturing device comprises a camera for capturing two-dimensional image data (column 3, line 66 to column 4, line 5).

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 5 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki as applied to claims 1 and 12 above, and further in view of Suyama et al. (USPN 4,879,664), hereafter Suyama, or Stauffer (USPN 4,410,804).

18. Suzuki does not disclose that the image data are captured from a predetermined distance. Suyama discloses a three-dimensional position sensor comprising robot teaching apparatus wherein said image data of the reference object are captured by said camera (figure 11a, element

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35) from a predetermined distance (column 6, line 20-37). In addition, Stauffer teaches that if a two-dimensional sensor is used, the image processor is unable to simultaneously determine the distance to the object unless the objects are always positioned at a known distance (column 1, line 31-39). It would have been obvious to one of ordinary skill in the art at the time the invention was made to capture an image at a predetermined distance in order to calibrate a three-dimensional sensor as taught by Suyama or such that the distance to the object need not be determined by other means as taught by Stauffer.

19. Claims 6, 7, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki as applied to claims 1 and 12 above, and further in view of Maeno et al. (USPN 5,047,714), hereafter Maeno.

20. Regarding claims 6 and 17, Suzuki discloses a step of determining the orientation and/or position of the object and moving the robot arms to have said orientation and/or position, but does not disclose that the robot moves a second image capture device to have the determined orientation and/or position. Maeno discloses that said robot system further comprises a second image capturing device (figure 7c, element 10) and said robot situates said second image data capturing device to have said determined position (column 4, line 47-49) with respect to the object, and said processor processes second image data captured by said second image capturing device to detect position and/or posture of the object with respect to said second image data capturing device (column 4, line 54-63). It would have been obvious to one of ordinary skill in the art at the time the invention was made to move the second image capture device to have the determined orientation and/or position as taught by Maeno in order to provide fine-tuning adjustments to the orientation and/or position determined by the first image capture device.

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21. Regarding claims 7 and 18, Suzuki discloses that said robot system further comprises a second image capturing device (figure 1, element 11b) for obtaining three-dimensional position (column 4, line 5-16) and that said second image data capturing device is directed to a characterizing portion of the object (column 3, line 66 to column 4, line 5), but does not disclose that the robot moves the second image capture device to have the determined orientation and/or position. Maeno discloses that said robot situates said second image data capturing device to have said determined position with respect to the object; and said processor processes second image data captured by said second image capturing device to detect position and/or posture of the object with respect to said second image data capturing device (see discussion of claims 6 and 17 above).

22. Claims 8-10 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki as applied to claims 1 and 12 above, and further in view of Sakakibara et al. (JP 07-270137), hereafter Sakakibara, English language translation included.

23. Regarding claims 8-10 and 19-21, see 35 U.S.C. 112 second paragraph rejection above.

24. Regarding claims 9 and 20, Suzuki does not disclose a second image capturing device comprising a three dimensional visual sensor of spot-light scanning type. Sakakibara discloses a three dimensional visual sensor usable in robot automation (page 1, paragraph 1), of spot-light scanning type capable of measuring distance between the sensor and an object (page 3, paragraph 15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a three dimensional visual sensor of spot-light scanning type as taught by Sakakibara in order to accurately determine the three dimensional position of an object using one device.

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25. Regarding claims 10 and 21, Suzuki does not disclose a second image data capturing device comprising a structured-light unit for irradiating a structured light on an object.

Sakakibara discloses an image data capturing device comprising a structured-light unit for irradiating a structured light on an object and capturing an image of the object including the irradiated light on the object (page 3, paragraph 16). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a structured light unit as taught by Sakakibara in order to accurately determine the three dimensional position of an object using one device.

26. Claims 11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki in view of Maeno as applied to claims 7 and 18 above, and further in view of Kelley et al. (USPN 4,305,130), hereafter Kelley.

27. Neither Suzuki nor Maeno expressly disclose that said robot operation is an operation of picking up at least one object from a plurality of objects overlapped with each other. Kelley discloses an apparatus and method to enable a robot with vision to acquire, orient and transport workpieces including a robot operation of picking up at least one object from a plurality of objects overlapped with each other (figure 9; column 13, line 6-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to pick objects from a plurality of overlapping objects as taught by Kelley in order to retrieve randomly oriented parts from a bin to save time by automatically orienting the parts for manufacturing or the like (column 1, line 12-32).

Conclusion

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28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- USPN 4,611,292 to Ninomiya et al. discloses a robot vision system comprising a three dimensional vision sensor.
- USPN 6,135,854 to Masumura et al. discloses an automatic workpiece transport apparatus for double-side polishing machine.
- USPN 4,876,728 to Roth discloses a vision system for distinguishing touching parts.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan J Hesseltine whose telephone number is 703-306-4069.

The examiner can normally be reached on Monday - Friday, 8 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on 703-308-6604. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-0377.

rjh
January 16, 2003


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